



COPY

P/IR-1609(2-1941)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re Patent Application of

New York, New York

Daniel M. Kinzer

Date: November 29, 2004

Serial No.: 09/292,186

Group Art Unit: 2811

Filed: April 15, 1999

Examiner: Shouxiang HU

For: P-CHANNEL TRENCH MOSFET STRUCTURE

Appeal No.: 2004-1428

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR REHEARING

RECEIVED
JAN 31 2005
OFFICE OF PETITIONS

Sir:

This Request For a Rehearing is made following a Decision on Appeal dated September 27, 2004 in the above noted appeal. Appellant respectfully requests rehearing to address points believed to have been misapprehended or overlooked in rendering the Decision and to consider entry and review of Appellant's Reply Brief. The following points provided with particularity in this Request for Rehearing are discussed in greater detail in Appellant's Reply Brief.

The References

Darwish, et al. (Darwish)	US Patent No. 5,674,766
Floyd, et al. (Floyd '043)	US Patent No. 6,069,043
Floyd, et al. (Floyd '716)	US Patent No. 6,090,716

The Rejection

Claims 1, 3-6, 8-13 and 20-22 stand rejected under 35 USC § 103 as being obvious over Floyd '716. In its Decision, the Board also considers Floyd '043 and Darwish.

Teachings of the Prior Art

In its Decision, the Board states that Floyd '716 discloses a trench-type power MOSFET that differs from the MOSFET claimed only in the polarity of the separate devices. Appellant

respectfully notes that Floyd '716 is a planar-type device, where the device recited in independent claims 1, 4 and 9 is a vertical device with a drain contact on the substrate. Floyd '716 teaches a planar device with a backside layer 60 composed of polysilicon (column 2, lines 53-54 and 65-67). Accordingly, the device disclosed by Floyd '716 and that recited in claims 1, 4 and 9 of the present invention are substantially different devices. Appellant therefore respectfully requests reconsideration of the application of Floyd '716 in the rejection of claims 1, 3-6, 8-13 and 20-22.

Appellant also respectfully requests consideration of Appellant's Reply Brief in which the applicability of Floyd '716 is discussed in greater detail.

Differences in Complementary Devices

The Opinion of the Board states that the Appellant has not provided evidence that one of ordinary skill in the art would have been unable, through no more than routine experimentation, to adjust for differences in mobility between holes and electrons. Appellant respectfully submits that the present application provides ample evidence illustrating the well known difficulty of designing a P-channel type device that operates as well as a complementary device. For example, N-channel devices are desirable for their lower on resistance, but have the disadvantage of more complicated circuitry needed to operate the devices. Additional circuitry is needed to raise the gate voltage of an N-channel device above the voltage on the source or drain to turn the device on. P-channel devices have a higher on resistance, but offer the advantage of less complicated circuitry for operation. Appellant believes that it should be inferred and apparent from the application, cited prior art references and literature in the field that it would be an extraordinary breakthrough to obtain a P-channel device that offers the same or better operational parameters as that of a complementary device. It is for this reason that any P-channel type device that offers lower than conventional on resistance is highly desirable. The present invention describes such a P-channel device. Appellant therefore submits that the present application, the cited prior art references and relevant literature demonstrate that those of ordinary skill in the art are aware of the difficulties in producing a P-channel type device that matches the performance of a complementary device. Indeed, Appellant submits that there is no known way to produce a P-channel device that matches the performance of a complementary N-channel device in the design of power semiconductors. Accordingly, Appellant respectfully submits that ample evidence of the inventiveness of the present invention has been presented to show that more than

routine experiment is required to adjust for differences in mobility between holes and electrons and provide comparable performance in the design of power semiconductors.

Comparison of Closest Prior Art

The Opinion of the Board states that Appellant's evidence does not make a comparison with the closest prior art. The Opinion suggests that Appellant should have compared the P-channel type MOSFET claimed in the present invention to other N-channel MOSFETS for performance, such as the N-channel MOSFET disclosed by Floyd '716.

Appellant respectfully requests that this point be reconsidered, especially in view of the above discussion, where it is noted that the characteristics of P-channel and N-channel type devices differ significantly. Appellant respectfully submits that it would be inappropriate to compare P-channel devices with N-channel devices because of their significantly different principles of operation, such as the different modes of operation for the devices, and because of the extra circuitry needed to properly operate an N-channel type device, and the known characteristic of higher on resistance for P-channel type devices. Accordingly, Appellant respectfully requests that the evidence provided in the present application be considered as providing a comparison with the closest prior art to show improved results.

The Opinion also states that the modifications represented by the present invention recited claims 1, 3-6, 8-13 and 20-22 over the prior art would reasonably have been expected to achieve a reduced on resistance. However, Appellant notes that the removal of the epitaxial layer normally results in a reduced voltage rating device, as discussed on page 2, lines 24-30 and page 3, line 26-page 4, line 2. Appellant therefore believes that it would not be expected or reasonably clear that the removal of the epitaxial layer would still permit the construction of a device with an equivalent voltage rating. The equivalent voltage rating is permitted by the constant gradient channel, which assumes the responsibility for voltage blocking in the inventive device. Accordingly, the present invention not only has an equivalent voltage rating to that of the prior art, but also has a reduced resistance, which two facts taken together produce unexpected results.

Moreover, Appellant respectfully believes that the conclusion of expected lower on resistance in the Opinion relies on an inappropriate analysis usually referred to as the "obvious to try" standard for obviousness. The conclusions stated by the Examiner and in the Opinion suggest that on resistance should be lowered by removing the blocking layer, however, as noted

above, such a modification of the prior art would lower the blocking voltage rating of the device, and render it unsatisfactory for its intended purpose. Appellants modification of the channel to have a constant gradient is the inventive step that permits the removal of the epitaxial layer. Appellant therefore respectfully requests that the conclusions of the Examiner and in the Opinion related to an expectation of removing the expitaxial layer be reviewed under an appropriate standard for obviousness.


Conclusion

Appellant respectfully submits that this Request for a Rehearing states particular points that are believed to be overlooked with regard to the prior art, namely, that Floyd '716 teaches a planar device that does not result in the present invention reciting claims 1-6, 8-13 and 20-22 if the polarity of the device by Floyd '716 were reversed. In addition, Appellant urges the reconsideration of the evidence provided to find that the present invention would not be achieved by one of ordinary skill in the art without undue experimentation, and that the proper comparison of the closest prior art is a P-channel type MOSFET. Appellant also requests reconsideration of the evidence presented in the specification regarding a vertical conduction trench-type P-channel MOSFET with a surprisingly low on resistance for a given voltage rating.

Appellant also requests consideration of the Reply Brief that was not entered in the present Appeal which provides greater detail for the specific points discussed in this Request for Rehearing, including the arguments made with respect to the Examiner's position on the evidence of commercial success.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Appeal Briefs - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on November 29, 2004.

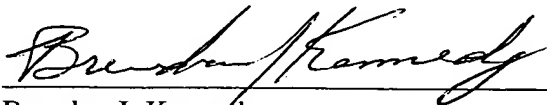
Registered Representative
Brendan J. Kennedy


Signature

11/29/04
Date of Signature

BJK:jh

Respectfully submitted,



Brendan J. Kennedy

Registration No.: 41,890

OSTROLENK, FABER, GERB & SOFFEN, LLP

1180 Avenue of the Americas

New York, New York 10036-8403

Telephone: (212) 382-0700